



## The Incentives to Invest in Job Training: Do Strict Labor Codes Influence this Decision?

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## **Abstract**

This paper studies the link between labor market regulations and the incentives of firms to invest in the human capital of their employees. We explore a firm level data set across several developing countries and compare the supply of formal training programs for firms exposed to different degrees of *de facto* labor regulations. Our findings show that a more flexible labor code tends to be associated with a *smaller* investment in job training. However, this effect is small and heterogeneous. Reforms that simultaneously accelerate the diffusion of temporary contracts and increase the protection of permanent workers tend to generate negative effects on the firm's investment in human capital.

**JEL Classification:** J24, K31, L25.

**Keywords:** On-the-Job Training, Employment Protection, Enforcement Regulations, Firm Level Data.

# 1. Introduction

In a context of increasing openness and international competition, several firms in developing countries struggle to constantly adapt their workforce to new technologies and organizational structures in order to remain competitive. Because skilled labor is relatively scarce in developing countries, job training emerges as an important tool to foster productivity. Nevertheless, the levels of this investment are surprisingly low in developing countries, especially when compared to those of developed countries. The investment in human capital is also important from an individual perspective since most of an individual's human capital is accumulated throughout life, either on-the-job or outside (Carneiro and Heckman, 2003). This investment in adult life is particularly important for the older and less educated workers, whose skills accumulated at school, have substantially depreciated and run a higher risk of social exclusion. Hence, policymakers are increasingly interested in understanding the main determinants of this investment. This paper investigates the role of labor market regulations in shaping the incentives of firms to invest in formal training programs.<sup>2</sup> We explore a large firm level data set across several developing countries and compare the supply of formal training programs in firms exposed to different degrees of *de facto* labor regulations.

There is a large ongoing debate on the benefits and costs of labor market regulations in developed and developing countries. While the efficiency costs of labor regulations have been discussed and documented by many, there is much scarcer evidence on the potential benefits of labor market regulations. Only a balanced analysis of the benefits and costs of regulations will give policymakers a full assessment of the effects of regulations on total welfare. One possible channel through which regulations might affect welfare in the economy is through the investment in job training. It has been argued that strict labor regulations might create longer term employment relationship which could, in turn, create a greater incentive for firms to invest in firm or sector specific job training (e.g., Wasmer, 2006). If this is true, and firms in developing countries under invest in job training, this increased incentive to invest should be

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<sup>2</sup> The analysis focuses exclusively on job training. It excludes the investment in skills for the unemployed or other training-related active labor market policies. We also restrict the attention to formal training programs. This is a shortcoming of most of the literature since it is very difficult to gather data on the informal job training.

considered as a potential benefit of labor market regulations. However, this positive link is not consensual. It is possible that strict labor market regulations increase the bargaining power of a small group of protected workers, leading to higher wages and to a reduced investment in job training (e.g., Mortensen and Pissarides, 1999). Whether or not stricter labor market regulations lead to an increased investment in job training is, therefore, an empirical question. To our knowledge, the potential benefits of this channel have not been rigorously explored empirically in the context of developing countries.

This paper explores a large firm level data set across more than 65 developing countries throughout the world to investigate the link between strictness of the *de facto* labor regulations and job training. The data we use is particularly interesting to study this topic. It collects simultaneously information on the incidence of job training and on several firm characteristics, including the degree of enforcement of labor regulation faced by each firm. Our findings strongly support that a stricter labor code is associated with a *higher* investment by firms in the human capital of their employees. Training incidence for a firm facing the 90th percentile of the enforcement of labor regulation relative to a firm facing percentile 10th is 2.1 percentage points higher in a country with a rigid labor regulation (that is, in the 90th percentile of the rigidity of employment index) than in a country with a less rigid labor regulation (i.e., in the 10<sup>th</sup> percentile). Nevertheless, the magnitude of the effect is quantitatively small (average training incidence in our sample is 45.2%).<sup>3</sup> The findings also suggest significant heterogeneity by types of regulation. While stricter hiring regulations and rigidity in the working hours are associated with a higher investment in job training, stricter firing costs tend to be associated with reduced investment in job training by employers. Therefore, labor market reforms that accelerate the diffusion of temporary contracts and, simultaneously, increase the protection of regular workers reduce the incentives of firms to invest in the human capital of their employees. We show that these findings are robust to several robustness checks.

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<sup>3</sup> Black and Lynch (1998) report that approximately 81% of the firms in their sample offer formal training programs in the U.S.. However, one should be cautious when comparing figures across countries which use different data sets. A major problem in this literature (also emphasized by Bassanini et al., 2005) is the lack of comparability in the training data. Household level surveys typically collect information on whether an individual received formal training or on training hours (e.g., Arulampalam et al., 2003). Firm level surveys collect information on the share of employees trained, training days or hours or total training expenditure (e.g., Barrett and O'Connell, 2001).

Determining the causal effect of labor market regulations on the incentive of firms to invest in job training is a difficult task. Labor market regulations are usually set at a national level and tend to change very infrequently over time. Empirically, this implies that there is little variation in the *de jure* law - either over time, across workers, or across geographic locations - that can be used to identify the effects of changes in the law on the incentives to provide job training. Simply exploring cross country variation in the *de jure* regulation is likely to raise several problems. In particular, it is possible that the degree of rigidity of the labor law is itself correlated with unobservable country characteristics (like quality of the institutions or education of the workforce) which, in turn, are also likely to affect the incentive to provide job training. Alternatively, it is also possible that countries that experience less training (e.g., due to higher worker turnover rates) have a greater demand to reform labor code in order to protect more the existent jobs. In this case, even labor market reforms are likely to be endogenous.

In this paper, we explore firm level data and within country variation in the enforcement of labor regulation.<sup>4</sup> We measure enforcement of labor regulations with the number of visits made by labor inspections to each firm. Our assumption is that labor regulations are more binding when firms with similar characteristics face a stricter enforcement of the labor law. However, simply comparing training incidence for firms located in the same country (and hence subject to the same *de jure* labor law) but subject to different degrees of enforcement of labor regulation is likely to yield biased estimates on the causal effect of the labor law. The main reason is that variation in the enforcement of the labor law is likely to be non random. For example, in our data, enforcement of the labor law tends to be stricter for larger and better firms as well as for firms located in the capital city. Our empirical specification will include several observable firm characteristics that determine differences across firms in the degree of enforcement of the labor law. Moreover, we will also explore the differential effect of enforcement in countries with different degrees of rigidities in the labor law, after accounting for country fixed effects, firm characteristics and for the degree of enforcement of labor regulations (as well as other types of regulations). This approach allows us to see how training

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<sup>4</sup> Most of the literature on the effects of labor regulations has not emphasized the importance of enforcement of labor regulations. Exceptions include Boeri and Jimeno, 2005, Caballero, Cowan, Engel and Micco, 2004, Albrecht, Navarro, and Vroman, 2006, Almeida and Carneiro, 2007, 2008a).

incidence differs for firms with similar observable characteristics but facing different degrees of enforcement of labor regulations in countries with strict labor codes relatively to countries with more flexible labor codes. This approach is similar in spirit to a differences-in-differences approach as proposed by Rajan and Zingales (1998). Controlling for country fixed effects allow us to isolate the effect of unobserved country characteristics that are likely to be correlated with *de facto* labor regulations and with training incidence (e.g., level of development in the country). By controlling for firm characteristics (e.g., age, size, sector composition) we account for the differences across firms that could be simultaneously correlated with training incidence and with the degree of enforcement in the country. E.g., larger and more visible firms could be more likely to be subject to labor inspections in countries where the labor law is more rigid. Controlling for the degree of enforcement of labor regulations faced by firms, allow us to account for (unobservable) firm characteristics that could be simultaneously correlated with enforcement of the law and with the investment in job training, in countries with different degrees of rigidities in the labor law. We will also control for the overall degree of enforcement of other regulations (e.g., fiscal, health and safety, sanitation and environmental regulations).

This paper is related to different strands of the literature. On the one hand, it relates to the work linking firm characteristics with the incidence of job training.<sup>5</sup> In the context of developed countries, the empirical findings suggest that larger, capital intensive and more productive firms tend to train more (e.g., Black and Lynch, 2001, Frazis, Gittleman and Joyce, 2000). The incidence of job training, both at the country individual and at the firm level, also tends to be higher for a more skilled workforce (e.g., Bassanini et al, 2005). There is also some evidence documenting that firms adopting more flexible workplace practices and performance based schemes tend to offer more job training (e.g., Gittleman, Horrigan and Joyce, 1998). In the context of developing countries the evidence on employer provided training is much scarcer and often based on individual country case studies. For a detailed description of training programs and its

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<sup>5</sup> A related question, which we will not address in this paper, is whether training has any effect on firm productivity (e.g., Barrett and O'Connell, 2001 or Lopez-Acevedo and Tan, 2003) or whether the returns to job training are high (e.g., Almeida and Carneiro, 2008b). Machin and Vignoles (2001), review some of this literature.

financing in developing countries see Middleton, Ziderman and Van Adams (1993) and Canagarajah, Dar and Murphy (2001). One exception is Rosholm et al (2007) who analyze the wage return to the investment in job training using data for Kenya and Zambia. They find evidence of large wage returns to job training (approximately 20%) in these countries. They also show that the returns tend to increase with firm size and with training duration.<sup>6</sup> Frazer (2006) shows that workers in Ghana are willing to finance firm specific training, as they might be able to reap the benefits of this investment by setting up their own firms. More closely related to our work is Pierre and Scarpetta (2004). They explore the same firm level survey data that we do (although for a smaller sample), and link the investment of firms in job training with firm characteristics. They find that larger, public owned firms and more innovative firms tend to train more.

On the other hand, the paper relates to the large literature quantifying the effects of labor market regulations on efficiency and equity outcomes. While the efficiency costs of labor regulations have been discussed and documented extensively, both in developing and developed countries, its effects on redistribution and equity effects have been much less studied.<sup>7</sup> In particular, one possible channel through which regulations might affect welfare and redistribution in the economy is through the investment in job training.<sup>8</sup> Wasmer (2006) argues that employment protection creates longer-term employment relationships, which are necessary to invest in job training specific to a firm or sector. This could actually be a potential benefit of having employment protection regulations if firms are under-investing in this area. To our knowledge, the potential benefits of this channel have not been rigorously explored empirically in the context of developing countries. Pierre and Scarpetta (2004) tackle this issue but they explore variation in the

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<sup>6</sup> Rosholm et al (2007) and Frazer (2006) explore the same data that we do but for three African countries (Zambia, Kenya and Ghana). In these countries the survey is a matched employer-employee data set with information on job training in the workers module. This module is not the case for most developing countries, where training information is only available at the firm level.

<sup>7</sup> While there is some consensus that stricter labor regulations reduce unemployment turnover, there is more ambiguity on the overall effects of regulations on employment and unemployment levels. The effects of regulations on value added and productivity have been less studied but the evidence seems to suggest that there are also negative effects (e.g., Besley and Burgess, 2004, and Micco and Pages, 2006 and Almeida and Carneiro, 2008a).

<sup>8</sup> Labor regulations might also improve redistribution in the economy through the job-to-job and activity-inactivity transitions. The reduced evidence available for developing countries suggests that regulations tend to redistribute against the most vulnerable groups (see e.g., Heckman and Pages, 2004, and Almeida and Carneiro, 2007, for evidence in Latin America). Labor regulations can also be used to insure workers who would, otherwise, not be able to insure against the risk of becoming unemployed (e.g., Kugler, 2007).



manager's perception on how binding are labor laws. Their findings are, therefore, harder to interpret and subject to stronger endogeneity concerns. Reassuringly, both papers find that stricter labor codes tend to be associated with more job training. However, they do not differentiate their analysis by types of regulations.

For developed countries the link between job training and the stringency of the labor law is mixed. On the one hand, Acemoglu and Pischke (1998) argue that there are complementarities between regulation regimes and training systems, and that reducing firing costs and increasing employment flexibility could reduce the incentives to train. Their evidence focuses mainly on Germany versus the US. Bishop (1991) also finds evidence of a positive correlation between the incidence of formal training and the firm's firing costs. This evidence is consistent with labor regulations increasing the adjustment costs of firms through the hiring/firing of workers, and resorting to training instead. Moreover, it is also consistent with the argument that the stricter the labor regulations, the greater it will be the wage compression (i.e., the greater the wedge between the worker's productivity and the labor cost) and the more profitable would be the investment in job training for firms. Therefore, the combination of wage compression and high labor adjustment costs could favor the investment in job training. On the other hand, it is possible that stricter firing regulations make it more costly for firms to dismiss less able (or less suitable) employees, creating a more heterogeneous workforce. To the extent that training and ability are complements, firms with a more heterogeneous workforce should train less. Bassanini et. al. (2005) exploring household level data across 13 European countries and exploring cross country-time series variation on the *de jure* labor regulations, find some evidence of a negative correlation between employment protection of regular employees and the incidence of job training. However, they also find that a reduction in hiring regulations (e.g., through the diffusion of temporary contracts) is associated with a decrease in job training. Reassuringly, our findings, although exploring a very different methodology and data sets, will qualitatively be very similar to theirs.

The paper proceeds as follows. Section 2 describes the data and provides descriptive statistics for the incidence of job training in the sample. Section 3 proposes the empirical approach exploring a differences-in-differences methodology. Section 4.1 presents the main findings linking labor market regulations and job training and section

4.2 discusses the potential endogeneity of the enforcement of the labor law. Section 5 presents sensitivity analysis and heterogeneity of the effects. Section 6 concludes.

## 2. Data and Descriptive Statistics

The main data set we use is a large firm level data collected by the World Bank, *Enterprise Surveys*, covering 66 developing countries.<sup>9</sup> The surveys were conducted between 2002 and 2005 and the samples were designed to be representative of the population of firms in the sectors covered in each country. Although only one wave of data per country is included in our sample (the most recent wave), the information available in the survey has several advantages for analyzing this topic. First, the data is based on a common questionnaire across a large set of countries, yielding comparable information on several firm level characteristics. In particular, the survey collects information on age, size and geographical location, 2-digit ISIC sector of activity, export intensity, foreign and public ownership, and the human capital composition of the workforce. Table A1 in the appendix defines all the variables used in the analysis. Our final sample includes 35,229 firms distributed across a wide range of sectors (Manufacturing, 73%, Construction, 4%, Services, 21% and Agro-Industry, 2%). Within Manufacturing several industries are covered – auto and auto components, beverages, chemicals, electronics, food, garments, leather, metals and machinery, non-metallic and plastic materials, paper, textiles, wood and furniture. Table A2 reports the countries included in our sample: 18 countries in Africa (10% sample), 4 countries in the Middle East and North Africa (8% sample), 12 countries in East and South Asia (33.3% sample), 27 countries in Eastern Europe and Central Asia (32.9% sample), and 10 countries in Latin America (16% sample). Second, the data collects information on whether the firm provides formal job training to their workers. This is based on the survey question “*Do you offer formal (beyond “on-the-job”) training to your permanent employees?*”. It is worth noting that this job training program is offered by the firm but it is not necessarily

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<sup>9</sup> This data set is also known as *Investment Climate Surveys* and has been used for studying this and other topics (see e.g., Svensson, 2003, Almeida and Carneiro, 2008a, Almeida and Fernandes, 2008, Pierre and Scarpetta, 2004, and Aterido, Hallward-Driemeier and Pagés, 2007). Previous versions of this project within the World Bank include the *Regional Program on Enterprise Development* collecting firm and worker level data in Sub-Saharan Africa countries for a decade (e.g., Rosholm et al, 2007, Frazer, 2006), and the *World Business Environment Survey*.

fully financed by the firm itself. Depending on the country, region or sector of activity training can be subsidized by the government (e.g., through training levies) or supported by the workers (e.g., through lower wages). The programs might also be organized by the firms themselves, by training institutes (e.g., public training institutions). Third, the survey collects information on a number of inspections faced by the firm relating to labor, fiscal, health and safety, environmental and municipal inspections. We use this information to proxy the degree of enforcement of regulation faced by each firm, after conditioning on several observable firm characteristics (Almeida and Carneiro, 2008a, follow a similar approach). Accounting for the enforcement of the law is particularly important in the context of developing countries, where there is a large gap between the law stated on the books (*de jure*) and its effective implementation (*de facto*). There enforcement tends to be weak and evasion of the law is large. In our empirical approach, we will explore within country variation in the enforcement of labor regulation to identify the effects of the labor law on training incidence after conditioning on several firm characteristics and on the overall enforcement of the law faced by the firm.

We use information on the *de facto* labor regulations from the World Bank Doing Business Data set (e.g. Botero et al, 2004). This data measures the overall degree of rigidity of the labor code (through the rigidity of employment index) but collects also disaggregated information on hiring, firing and hours regulations. In particular, we use information on four labor indices: rigidity of employment, a difficulty of hiring, rigidity in working hours, difficulty of firing, and on firing costs.<sup>10</sup> Finally, we also explore country level governance indicators, between 2000 and 2005, in Kaufmann and Kraay (2007)<sup>11</sup>, and on number of procedures to start a business, also taken from the World Bank Doing Business dataset, between 2003 and 2006.

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<sup>10</sup> The rigidity of employment index is the average of three indices: a difficulty of hiring index, a rigidity of hours index and a difficulty of firing index. The difficulty of hiring index is closely linked to the application of fixed-term contracts. The rigidity of hours index relates to the possibility of having night, weekend and overtime work. The firing cost indicator measures the cost of advance notice requirements, severance payments and penalties due when terminating a redundant worker (and is expressed in weekly wages). Higher values of the indices indicate more rigid labor regulations.

<sup>11</sup> Higher values correspond to better governance outcomes. Rule of Law captures the extent to which agents have confidence in and abide by the rules of society (e.g., quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence). Control of Corruption captures the extent in which public power is exercised for private gain, including petty and corruption, as well as “capture” of the state by elites and private interests. Regulatory Quality is the ability of the government to

We define the incidence of training at the firm level with a dummy variable assuming the value one if the firm reports having offered a formal training program to its employees. Since the data set is harmonized across countries, we hope that the measurement error problems in the training variable are not too severe. However, the interpretation of what a formal training program is might differ across countries, or even within countries across firm size or sector of activity. Our empirical approach minimizes this problem since we always control for country and sector fixed effects and, therefore, we explore within country and within sector variation in job training.<sup>12</sup> Moreover, we will also test the robustness of our findings to time invariant effects for each combination of country, city, sector and size. To check whether our variable of interest is economically meaningful, we have analyzed the relation between the average propensity to train (at the country level) and different country characteristics, like degree of education, openness, technology adoption and labor productivity (measured as value added per employee). Figures 1 to 4 report sensible patterns for our data at the country level. They document a strong and positive correlation between investment in job training at the country level and the level of development in the country (captured by GDP per capita), its human capital composition (captured by years of schooling of the population), the degree of openness (captured by the trade as a % of GDP) and the degree of innovation and technology adoption (captured by the investment in R&D as a percentage of GDP). Although these plots cannot be interpreted as causal, we interpret this evidence as being suggestive that our job training measure captures an economically meaningful activity.<sup>13</sup> These correlations are also in line with what others have found in the context of developed countries (see e.g., Bassanini et al, 2005). Figure 5 presents the link between an overall

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formulate and implement sound policies and regulations that permit and promote private sector development.

<sup>12</sup> It is plausible that managers interpret differently the meaning of formal training programs. This could introduce measurement error in the dependent variable in our empirical work. If this measurement error is classic, this is not a problem. However, biases could result if the measurement error is systematically related to firm characteristics of interest (like enforcement of the labor law). It is worth stressing that the survey only covers formal training and, therefore, episodes of informal training are not considered. This will probably lead to an underestimation in the total the amount of training provided, especially in small and micro firms, where most of the training is likely to be informal (Barron et al, 1987).

<sup>13</sup> These correlations are robust to alternative openness and innovation measures taken from the *Enterprise Surveys* and aggregated at the country level (e.g., share exporting firms, share firms with foreign licenses, share of firms with an ISO certification). The propensity to train is also negatively correlated with education measures taken from the *Enterprise Surveys* (e.g., share of workers with less than 5 years of education).

*de jure* measure of labor rigidity and the intensity to train at the country level. There is a negative, though insignificant, cross country correlation between stringency of *de jure* labor law and training incidence. However, at the country level it is very difficult to control for several unobserved country characteristics, policies and institutions that are likely to affect both variables. In the next section we investigate this link more in depth exploring within country variation in training incidence and in the *de facto* labor regulation faced by each firm.

Finally, figures 6 and 7 document significant heterogeneity in the incidence of job training, by firm size, across regions and income levels in our sample. While 45% of the firms in our sample offer formal job training programs to their employees, this number increases to 61.4% in the set of large firms (and is 23.7% for the micro firms) Training incidence is lower among the smaller firms even across all the regions and income groups considered in our sample. These patterns hold separately for manufacturing and services, though training incidence in services is smaller than in manufacturing sectors (not reported). Across regions and income group, we also find that the incidence of training at the firm level is higher among innovative firms, exporters or firms with foreign participation (not reported).

### **3. Empirical Methodology**

We are interested in analyzing the link between labor regulations and training incidence. As discussed in the introduction, theory is inconclusive about the predicted sign. On the one hand, a stricter employment protection law could lead to longer job tenures and, therefore, to an increased investment in job training (Wasmer, 2006). Acemoglu and Pischke (1998) also argue that, in the presence of labor market rigidities, there could be complementarities between regulation regimes and training systems. On the other hand, a stricter labor codes might increase the bargaining power of the insiders and lead to higher wages and to lower investment of firms (e.g., Mortensen and Pissarides, 1999). Alternatively, it is also possible that stricter firing regulations make it more costly for firms to dismiss less able (or less suitable) employees, creating a more heterogeneous workforce. To the extent that training and ability are complements, firms with a more heterogeneous workforce should train less.

Our empirical framework considers profit-maximizing firms deciding whether or not to provide on the job training to its workforce. A firm will decide to offer training if this decision is expected to increase its profits, i.e., if the benefits from this decision are larger than the costs. Let  $\pi_{ijc}^*$  be the profits of a firm  $i$  in industry  $j$  in country  $c$ . We assume that:

$$Train_{ijc} = \begin{cases} 1 & \text{if } \pi_{ijc}^* > 0 \\ 0 & \text{otherwise.} \end{cases} \quad (1)$$

where,  $Train_{ijc}$  is a dummy variable that equals one if firm  $i$ , operating in sector  $j$  and country  $c$ , reports providing training. Since  $\pi_{ijc}^*$  is unobserved, equation (1) cannot be estimated directly. Therefore, we assume that  $\pi_{ijc}^*$  is a function of several observable firm, industry, and country characteristics. In particular, we assume that  $\pi_{ijc}^*$  is linear so that,  $\pi_{ijc}^* = \delta R_c * E_{ijc} + \gamma E_{ijc} + \beta X_{ijc} + \mu_j + \mu_c + \varepsilon_{ijc}$ , where  $R_c$  is a measure of the *de jure* labor regulation in country,  $E_{ijc}$  is a measure of the enforcement of labor regulations and  $X_{ijc}$  captures firm level characteristics of interest of firm  $i$  (including firm size, age of the firm, firm location, exporter, foreign and public ownership dummies).  $\eta_c$  and  $\mu_j$  are time invariant effects capturing country and 2-digit industry unobserved characteristics. Finally,  $\varepsilon_{ijc}$  captures unobserved firm characteristics correlated with training incidence. Using this functional form, the probability that firm  $i$  offers training is given by:

$$\Pr(Train_{ijc} = 1) = \Pr(\varepsilon_{ijc} > -\delta R_c * E_{ijc} - \gamma E_{ijc} - \beta X_{ijc} - \mu_j - \mu_c) \quad (2)$$

Assuming that the residuals  $\varepsilon_{ijc}$  are normally distributed, equation (2) can be estimated by maximum likelihood (probit). We do not cluster the standard errors.<sup>14</sup> We measure  $E_{ijc}$  with the number of visits made by labor inspectors to the firm and  $R_c$  with the Doing Business measures of the *de jure* labor market regulations.

The main coefficient of interest is  $\delta$ . Having all else constant,  $\delta$  quantifies the percentage point difference in the probability of a firm offering job training for firms facing a different degree of enforcement of labor regulations in countries with strict *de*

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<sup>14</sup> However, if we were to allow for correlation in training incidence across firms in the same country and industry, the magnitude and significance of the main empirical findings would be very similar (available on request).

*jure* law versus countries with looser regulation. This approach is similar in spirit to a differences-in-differences approach (e.g., Rajan and Zingales, 1998). Having all else constant, we compare the effect of labor regulations for firms located in the same country (and hence subject to the same *de jure* labor law) but facing different degrees of enforcement of labor regulation (i.e., subject to the same *de facto* labor law). It is worth stressing that we are not exploring the variation in the enforcement of labor regulation alone. Rather, we explore the differential effect of enforcement in countries with different degrees of rigidities in the labor law, after controlling for country fixed effects, several firm characteristics and for the degree of enforcement of labor regulations. Controlling for country level fixed effects allow us to account for unobserved country characteristics that are likely to be correlated with *de facto* labor regulations and with training incidence (e.g., level of development in the country). The inclusion of several firm characteristics (like age, size or industrial composition) also allow us to account for the differences across firms that could be simultaneously correlated with training incidence and with the degree of enforcement in the labor law. For example, larger and more visible firms are more likely to be subject to labor inspections in countries where the labor law is more rigid. Finally, controlling by the degree of enforcement of labor regulations, we account for (unobservable) firm characteristics that could be simultaneously correlated with the enforcement and with training in countries with different degrees of rigidities in the labor law.

If we were to identify the effects of regulation on the incidence of training exploring only cross country information on the *de jure* labor regulation, the identification of the effect on training would come only from cross country differences in the law as it is stated in the books. This would raise three important problems. First, countries that differ in the degree of stringency of the labor law are likely to differ in several other omitted policies and institutions, like their level of development, rule of law, quality of institutions, which could also affect the investment in job training. Second, countries with higher labor turnover are less likely to invest in job training and could arguably demand a stricter labor code. This could raise the problem of causality from labor market outcomes to labor regulation rather than the other way around. Finally, in the context of developing countries there is a large gap between the *de jure* regulation

and the *de facto* law faced by firms since compliance is law and evasion tends to be large. The proposed empirical approach, tries to mitigate these problems by exploring within country variation in the enforcement of the law after controlling for country fixed effects, by the degree of enforcement of the labor law and by several firm characteristics.

Table 2 starts by documenting the relationship between training incidence and several firm level characteristics ( $X_{ijc}$ ), which will serve as controls in our main analysis. The table reports the marginal effects at mean values of the variables of interest. All the specifications control for country fixed effects and for 2-digit ISIC sector fixed effects. The latter is important because firms in the same industry are likely to face a similar production technology, product demand or degree of product competition. All these characteristics are likely to affect the incentives of firms to invest in job training. Moreover, it is also possible that the definition of a formal training program differs across industries and countries. We hope that this set of firm and country level controls minimizes the potential problem of reverse causality (i.e., causality running from incidence of training to strictness of enforcement of labor regulations) that plagues most of the cross country work.

Column (1) in table 2 reports the relation between training incidence on the one hand and firm size, age and location on the other. As found by others, larger and younger firms are more likely to offer training (e.g., Frazis, Gittleman and Joyce, 2000). For example, firms with more than 100 employees are at least 40 percentage points more likely to offer training programs than micro firms (less than 10 employees). One possible explanation for this is that there are economies of scale in training provision that only larger firms can exploit. Almeida and Carneiro (2008a) find evidence that there are large fixed costs in the provision of formal job training programs. Younger firms in developing countries are also more likely to offer job training but the magnitude of the effect is close to zero.<sup>15</sup> We also find that firms located in the capital city or in large cities (defined as having more than 1 million inhabitants) are also more likely to offer job training. Column (2) includes as additional controls the degree of firm openness, captured by a dummy variable assuming the value one if the firm exports and three dummy variables for

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<sup>15</sup> A quadratic term on age of the firm is included. The point estimate (not reported) is always statistically insignificant.



whether the firm has a minority (less than 50%), majority (50%-99%) or full foreign ownership. The findings clearly show that more open firms are also more likely to invest in the human capital of their employees. Moreover, the greater the share of foreign capital in the firm's total capital, the more likely it is that firms offer training programs. For example, all else constant a firm with full foreign ownership is 8 percentage points more likely to train their employees than a fully domestic owned firm.<sup>16</sup> In column (3), we do not find evidence that, all else constant, firms with a public ownership differ in their intensity to train. Column (4) shows that there is also a strong positive correlation between average schooling of the workforce and the incidence of job training. This correlation is still positive (though it does not remain statistically significant) if we use share of skilled workers as a proxy for the worker's human capital (column 5). The complementarity between the worker's education and the firm's investment in job training as been documented extensively in the literature for developing and developed countries using also household level data (e.g., Lillard and Tan, 1992, Altonji and Spletzer, 1991, Mincer, 1996 or Leuven, 2004 for a survey). To maximize the number of observations, the variables in column (5) will serve as controls in our base specification throughout the paper. Finally, column (6) reports that the main findings in column (5) would remain robust if we allowed the industry fixed effects to vary by country.

## 4. Labor Market Regulations and Investment in Skills

### 4.1. Main Empirical Findings

Table 3 reports the point estimates for  $\delta$  under alternative sets of controls, and using always an overall index of employment rigidity capturing simultaneously rigidities in firing, in hiring and in adjusting the working hours. All the specifications include

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<sup>16</sup> The positive correlation between openness and the investment in skills does not necessarily imply causality. For example, it is possible that foreign ownership self select into the "best" domestic firms. In this case, the positive coefficient would be simply caused by the cherry picking of firms (see e.g., Almeida, 2007 or Tybout, 2000). Almeida and Fernandes (2008) also show that that more innovative firms also tend to be more open which in turn could be driving the results if the investment in physical and in human capital are correlated. The results (not reported) show that the link is robust to adding controls for whether the firm has recently adopted new technology, the share of R&D in total sales, whether the firm as an ISO certification and the manager's years of education. The findings also show that, all else constant, there is a positive link between technology adoption and the investment in human capital at the firm level and between the manager's education and the investment in human capital.

country and 2-digit industry fixed effects (total of 27 categories). The coefficient on  $X_{ijc}$  are very similar from those reported in table 2 and, therefore, we abstract from presenting and discussing them here. Column (1) shows that, after controlling for country and industry fixed effects and for the degree of enforcement of the labor law, the interaction term is positive and statistically significant. This implies that firms exposed to a stricter enforcement of the law tend to offer more job training, relative to firms facing looser enforcement, in countries with more stringent labor regulations. In the last row of the table, we use the point estimate on  $\delta$  to quantify the differential effect in training incidence by reporting the magnitude of the impact of labor rigidity on training incidence. Using the estimate in column (1) we obtain the differential 0.0218. This number implies that the incidence of job training for a firm facing the 90th percentile of the enforcement of labor regulation relative to a firm facing percentile 10th is 2.1 percentage points higher in a country with a rigid labor regulation (that is, in the 90th percentile of the rigidity of employment index like Mozambique) than in a country with a less rigid labor regulation (i.e., in the 10<sup>th</sup> percentile like Mauritius or Armenia). This percentage point difference in training incidence is not particularly large if we consider that the average incidence of job training in our sample is 45.2%.

The remaining columns of table 3 will show that this positive correlation between training incidence and labor regulations will be robust to several firm and country level controls. Moreover, the point estimate on the interaction term between enforcement and labor regulation will be quite stable and remains significant across specifications (approximately 0.002). This implies that the incidence of job training for a firm facing the 90th percentile of the enforcement of labor regulation relative to a firm facing percentile 10th is approximately 3.5 percentage points higher in a country with a rigid labor regulation than in a country with a less rigid labor regulation.

In column (2) of table 3 we include the several firm characteristics reported in column (5) of table 2. As discussed above these characteristics are linked to the intensity to provide job training and are also related to the incidence of labor inspections.<sup>17</sup> One

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<sup>17</sup> A regression of the (log) number of visits made by labor inspectors on firm characteristics shows that larger, older and more open firms are more likely to receive visits from labor inspectors (after controlling for country and sector fixed effects). These correlations are robust to controlling for the total number of inspections.

potential problem with this specification is that the interaction term could be capturing the fact that firms receiving more labor inspections are also more likely to receive inspections related with other types of regulations (e.g., fiscal, environmental, health and safety or municipal). This could happen, for example, if inspectors have a performance pay scheme encouraging inspections in larger firms (e.g. Cardoso and Lage, 2007 argue that this happens in Brazil) or if the main objective of inspections (either labor or other) is to extract rents (rather than to enforce the law). To minimize this problem, column (3) includes as additional control the interaction between labor market regulations and the total number of inspections made to each firm (as well as the total number of inspections in level). The inclusion of these variables is likely to address this concern as long as the probability of having an inspection in order to extract rents is not higher for labor than for other inspections, in countries with different degrees of rigidity of labor laws. In column (4) the point estimate of interest almost doubles and remains statistically significant. This suggests that part of the variation in the enforcement of labor regulations, in countries with labor codes with different degrees of rigidity, is actually explained by total enforcement of the law within the country.

In the remaining columns of table 3 we test the robustness of the main findings to several robustness tests. One source of concern could be driven by the fact that *de jure* labor market regulations are correlated with other country level characteristics which could affect training differently depending of the degree of enforcement of labor regulations. Heckman and Pagés (2004) and Botero et al (2004) show that the degree of stringency of employment protection laws tends to decrease with income levels. The results in column (4), controlling for differences across countries in GDP per capita, do not change. Results are also robust to the inclusion of alternative measures of a country's institutional quality - rule of law, regulatory quality and the government control of corruption - which are likely to be simultaneously correlated with the stringency of labor market regulations and also with the incidence of job training. For example, if countries with a more stringent labor regulation also tend to have more corrupt governments where public power is exercised for private gain, then it is possible that training incidence is affected simply because rent extraction in larger and best firms. Column (5) to (7) also report that the point estimates for  $\delta$  remain unchanged.

Finally, we test whether labor regulations are simply capturing the effect of entry regulations. Indeed, it is quite plausible that the political economy that leads to the enactment of job security regulations in some countries also leads to the ratification of regulations on firm entry. Since Davis and Haltiwanger (1999) show that entry and exit of firms explains a large share of total labor reallocation they are also likely to affect labor turnover at the firm level, which in turn affects the investment in job training. To minimize this concern we include as additional control the interaction of labor regulations with a measure of how costly is firm entry at the country level (captured by the number of procedures to start a business) multiplied by the enforcement of labor regulations. The findings, reported in columns (8) remain again unchanged.

Reassuringly, throughout columns (5) to (8) of table 3 we always find that the effect of the interaction of labor inspections with alternative measures of the quality of the country institutions and entry regulations is never statistically significant. This gives us additional confidence that the strong effect that we identify on job training is indeed coming from the differential effect of labor market regulations through the enforcement of the labor law.

Table 4 reports additional robustness checks over our basic specification (column (4) of table 3). As discussed above one concern could be that labor inspections serve primarily as a mean of rent extraction. In this case the coefficient on  $\delta$  would be biased upwards simply because more productive firms could be inspected more often in countries where regulations are stricter (and are also more likely to offer job training programs). In table 4, we argued that including the interaction of labor regulations with the total inspections minimized this concern. In columns (1) to (3) of table 4, we test whether the main findings are robust to the inclusion as additional controls the interaction of the rigidity in labor regulations with measures of how likely are inspections to serve as means of rent extraction (as well as the variables in levels). We speculate that labor inspections are more likely to be associated with rent extraction (for firms with similar observable characteristics and exposed to the same *de jure* regulations) when managers spend more time dealing with government officials, perceive that property rights are poorly enforced in the country or when the manager's education is lower. The point

estimates again suggest that the main effect on training incidence is not driven by these concerns.

Another potential concern is that there are unobservable factors linked with policies or institutions within each country that could simultaneously affect the incidence of job training at the firm level and the enforcement of the labor law in countries with different degrees of labor regulations. Columns (4) to (6) test the robustness of the main findings to alternative combinations of country, location, sector and size fixed effects. Again, we do not find any evidence that accounting for these effects significantly affects the main coefficient of interest.

## **4.2. Endogeneity of Enforcement of Labor Market Regulations**

One of the main shortcomings of this approach is that the degree of enforcement of labor regulation could be endogenous to training incidence. In other words, it is possible that there are unobservable firm level characteristics driving simultaneously training incidence and the enforcement of labor regulation at the firm level at different degrees of stringency of labor codes.<sup>18</sup> One way to minimize this concern is to compute a more aggregate measure of the enforcement of labor regulation. We propose to proxy inspections faced by each firm with the average inspections in the country-region-sector and size where the firm is located (see e.g., Dollar et al, 2005).<sup>19</sup> This is arguably a more exogenous measure of enforcement to the incidence of job training in the firm, although it is still closely related to the enforcement faced by the firm itself. We compute the average number of inspections in the country, region, sector and size bracket where the firm is located (excluding the inspections faced by the firm itself).

Table 5 reports the point estimates after clustering the standard errors at the same level of aggregation as mean inspections. The last row of the table reports the implied percentage point difference in training incidence for a firm facing the 90th percentile of the enforcement of labor regulation relative to a firm facing percentile 10th in a country with a rigid labor regulation (that is, in the 90th percentile of the rigidity of employment

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<sup>18</sup> Almeida and Carneiro (2007, 2008a) face the same problem and compute a measure of how costly is to supply enforcement in each Brazilian city (which is closely linked to travel time by car). Since in our data we do not know in which city each firm is located, we cannot compute an analogous instrument.

<sup>19</sup> Dollar et al (2005) propose a similar instrument for investment climate variables to determine their effect on firm performance.

index) relative to a country with a less rigid labor regulation (i.e., in the 10<sup>th</sup> percentile). The degree of aggregation of inspections by sector of activity varies across the three columns.<sup>20</sup> The findings clearly confirm that there is a strong and positive correlation between training incidence and the degree of stringency of the *de facto* labor code faced by each firm. Nevertheless, the magnitude of the effect increases significantly (last row of table 5). For example, the point estimate in column (1) implies that the magnitude of the effect of regulations on job training more than doubles to 7 percentage points, from 3.4 percentage points in our basic specification (column (4) of table 3). The effect of labor inspections increases when disaggregating the sector classification.

An alternative approach to mitigate the possible endogeneity concern of labor market regulations in equation (2) is to allow the effect of *de facto* regulations to vary on an additional dimension. We follow Micco and Pages (2007) and assume that the stringency of labor market regulations produces larger effects in more volatile sectors, i.e., in sectors with a larger intrinsic labor (or inputs) reallocation needs due to the volatility of demand and supply of shocks. This idea was first developed by Rajan and Zingales (1998) and implemented in this type of literature by Micco and Pages (2007).<sup>21</sup> Micco and Pages (2007) find that, across countries, some industries exhibit higher levels of job reallocation than others.<sup>22</sup> This suggests that there are important technological or product market characteristics that determine the relative volatility of employment in a sector. However, the observed sector specific labor reallocation in each country is likely to be itself affected by labor market regulations institutions. Under the assumption that labor regulations affect level of sector reallocation, though not the ranking within a country, the rank correlations across countries is a good estimate of the true rank correlation in the absence of labor market regulations. They proxy the intrinsic relative labor volatility in a sector in a given country in absence of adjustment costs by the

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<sup>20</sup> In column (1) we consider 2 groups (manufacturing and services), in column (2) we consider 9 groups and in column (3) we consider 27 groups.

<sup>21</sup> This methodology has been applied in other fields namely in the finance literature (e.g., Claessens and Laeven, 2003, Galindo et al, 2002, Galindo and Micco, 2004, Raddatz, 2006, and Rajan and Zingales, 1998).

<sup>22</sup> To identify an industry's intrinsic demand for adjustment, Micco and Pages (2007) use the rank correlation (across sector) of sector job flows of excess reallocation. They find that correlations tend to be positive, statistically significant, and large. In other words, across countries, some industries exhibit higher levels of job reallocation than others. This suggests that there are important technological or product market characteristics that determine the relative volatility of employment in a sector.

relative job reallocation of that industry in the United States (which, according to different measures, has one of the more flexible labor codes in the world).

The reduced form modeling the probability that firm  $i$  offering training is given by:

$$\Pr(\text{Train}_{ijc} = 1) = \Pr(\varepsilon_{ijc} > -\phi R_c * E_{ijc} * V_j^{US} - \lambda E_{ijc} * R_c - \theta E_{ijc} * V_j^{US} - \gamma E_{ijc} - \beta X_{ijc} - \mu_{jc}.) \quad (3)$$

where all the variables are as above and  $V_j^{US}$  is the US sector job reallocation in sector  $j$ .<sup>23</sup> The coefficient of interest now becomes  $\phi$ .  $\phi$  captures the differences in training intensity for firms exposed to different degrees of *de facto* regulations in sectors with a higher “intrinsic” labor reallocation relative to firms in sector with smaller labor reallocation needs.

The results of estimating equation (3) by maximum likelihood (probit) are reported in table 6. Columns (1) to (3) differ in the control variables included. In column (2) we include the interactions relative to total inspections (not included in (1)) and in column (3) we include the interaction with country level GDP per capita, which is similar to our main specification in column (4) of table 3. Again, the findings suggest that there is a positive correlation between stringency of the law and the supply of formal training programs. The empirical estimates for  $\phi$  in column (2) and (3) are positive and strong suggesting that firms facing a stricter *de facto* labor regulation and in sectors that are intrinsically more volatile tend to offer more job training relative to sectors that are not so volatile in countries with a looser *de facto* regulation. The last row reports that the magnitude of the effect increases more than 4x to almost 15 percentage points.

## 5. Sensitivity Analysis and Heterogeneity of the Effects

In this section we test the robustness of the main specification (column (4) of table 3) to alternative samples (geographical region, income group and city location). Table 7 tests the robustness of the main findings when we exclude from the sample different regions of the world. In column (1) we exclude African and Middle Eastern

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<sup>23</sup> We thank Carmen Pages for helping us using this data set as in Micco and Pages (2006). The data can be downloaded from <http://www.econ.umd.edu/~haltiwan/download.html>.

countries (18%), in column (2) we exclude East and South Asia (33.3%), in column (3) we exclude countries in Eastern Europe (32.9%) and in column (4) we exclude Latin American countries (16%). As before, the point estimates show that, for all the sub samples of countries, training incidence tends to be higher for firms facing a stronger enforcement relative to firms facing a looser enforcement in countries where the overall labor market regulation is more rigid. However, the magnitude and strength of the effect seems to be driven by countries in East and South Asia as well as by Latin American countries, where training incidence tends to be higher. In columns (2) and (4), when we exclude these two groups from the sample, respectively, the coefficient of interest becomes smaller and statistically insignificant. Therefore, excluding any of these two regions, we cannot reject that training intensity does not depend on the stringency of labor regulation across the world.

Column (5) of table 7 tests whether the link between enforcement of labor regulations and job training is different across low and middle income countries. We find that that training incidence is still positively correlated to the stringency of the *de facto* labor regulation when restricting the sample to the middle income countries. However, the magnitude of the effect becomes larger (5 percentage points) when we restrict the sample to middle income countries only. Finally, we test the robustness of our findings to the geographical location of firms. In our sample, more than 30% of the firms are located in the capital city and enforcement of the labor law also tends to be looser in the country capital city.<sup>24</sup> To the extent that training incidence is higher in capital cities (as reported in table 2), the geographical location could be biasing downwards the coefficient of interest (as long as these patterns are stronger when labor marker regulations are more rigid).<sup>25</sup> The results, reported in column (6), suggest that this is the case. Restricting the sample to firms located outside the capital city (although also in other cities) increases the

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<sup>24</sup> To investigate this we regress (log) labor inspections on firm size, location, openness, average worker education and public ownership and (log) total inspections, after controlling for country and sector fixed effects. All else constant, a firm located in the capital city has 14% lower labor inspections than firms else where.

<sup>25</sup> Brunello and De Paola (2008) and Brunello and Gambarotto (2007) find that training participation is lower in more agglomeration areas both in the U.K. and in Italy. They suggest that this is driven by higher turnover and poaching effects in more agglomerated areas. In our paper training incidence tends to be higher in the capital city. This could be explained, among other things, by larger pooling externalities associated with the diffusion of knowledge in larger cities of developing countries.



point estimate slightly, leading to a percentage point difference in training incidence between firms subject to different degrees of enforcement of labor regulation of 4 percentage points.

Manufacturing industries tend to be a more homogeneous and comparable group of firms across countries. In our sample, the manufacturing sector covers approximately 73% of the sample. Table 8 tests whether the results are robust to this sub-sample. In column (1) we consider all the manufacturing firms while in columns (2) and (3) we consider the set of high and low-tech industries, respectively. The reason for splitting up the sample by technological sophistication is that manufacturing industries with a higher degree of technological sophistication could be pressured to innovate and train more frequently than traditional industries. The results reported in column (1) show that the effect of the *de facto* labor regulations on the incidence of training remains positive and strong when we restrict the sample to manufacturing firms. The magnitude of the effect increases slightly which is suggestive that firms in manufacturing could be more constrained by the effects of regulation than non-manufacturing firms. In particular, the point estimate implies that the incidence of job training for a firm facing the 90th percentile of the enforcement of labor regulation relative to a firm facing percentile 10th is approximately 5 percentage points higher in a country with a rigid labor regulation (that is, in the 90th percentile of Doing Business Index) than in a country with a less rigid labor regulation (in the 10<sup>th</sup> percentile). Moreover, the effect seems to be mostly focused on the low-tech industries rather than in the high tech.<sup>26</sup>

In the previous discussion we have considered a general measure of rigidity of employment. This measure compiles stringency of the labor law with respect to three different dimensions: rigidity in hiring, rigidity in firing and rigidity in hours of work. Table 9 disaggregates the effect of the rigidity of labor regulations into specific components of the labor law (also obtained from the Doing Business data set). Column (1) replicates the basic specification (also reported in column (4) of table 3). Columns (2) to (6) replicate the basic specification but using alternative labor market rigidity indices: rigidity in hiring (capturing flexibility in fixed term contracts), rigidity in firing

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<sup>26</sup> We consider low tech industries the following sectors: Beverages, food, garments, leather, non-metallic and plastic materials, paper, other manufacturing, textiles, and wood and furniture (Parisi et al., 2006).

(capturing flexibility in firing permanent workers), firing costs (capturing total costs of firing permanent workers) and rigidity in hours of work (capturing flexibility in adjusting hours of work of permanent workers). The findings strongly suggest that *de facto* labor market flexibility affects job training in a non-linear way. On the one hand, the findings in column (2) and (5) show that improving the flexibility of the labor markets through fewer hiring regulations and more flexible working schedules (for example, through the diffusion of temporary contracts or allowing for nightshifts) is associated with a reduction of the investment in job training.<sup>27</sup> If firms are under-investing in job training, a potential benefit of having stricter hiring regulations is an increased investment in human capital (e.g., Wasmer, 2006). Reassuringly, our findings are qualitatively in line with Bassanini et al (2005) who explore household level data. They explore cross country and time series variation across *de jure* labor market regulations in 13 European countries and also find mixed effects of different types of labor regulations.

On the other hand, the findings in columns (3) and (4) suggest that an increase in the degree of employment protection for permanent workers decreases the provision of job training by firms. However, the magnitude of the effect remains quite small with the percentage point difference in training incidence being 3 percentage points and 2.3 percentage points lower for firms facing stricter firing regulations and more costly firing costs, respectively. This negative effect of rigidity in firing and of firing costs on training incidence can be explained, in a context of a search model with wage compression, by an increase in the bargaining power of the insiders which leads to an increase in wages and to a reduction in the investment supported by the firm (see e.g., Garibaldi and Violante, 2004, Mortensen and Pissarides, 1999). Alternatively, firing costs might increase the heterogeneity of the labor force by increasing the cost of dismissing the low ability workers.<sup>28</sup> To the extent that training and ability are complements, firms with a more heterogeneous workforce should train less.

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<sup>27</sup> We investigate more in depth the channel driving this correlation. In particular we run our baseline specification using as dependent variable the average turnover in the firm and exploring variation in the *de facto* hiring regulations and flexibility in hours. We can never reject that the two variables are not statistically correlated. Unfortunately, the number of firms reporting information on average turnover is reduced (less than 50% of the sample). Therefore, one should be cautious when interpreting these findings.

<sup>28</sup> We also investigate more in depth the channel driving this correlation. In particular we run our baseline specification using as dependent variable a measure of how heterogeneous is the workforce (captured by the standard deviation of the share workers with different degrees of education). We find that firms facing a

## 6. Conclusion

In a context of increasing openness and international competition, firms in developing countries struggle to constantly adapt their workforce to new technologies and organizational structures in order to remain competitive. Policymakers throughout the world are increasingly interested in understanding the determinants of the investment in skills in order for the countries to remain competitive in an international context. This paper analyzes the link between stringency of the *de facto* labor market regulations faced by firms and the incentive to invest in job training. We explore a large firm level data set across more than 65 developing countries throughout the world to investigate the link between strictness of the *de facto* labor regulations and job training.

Our findings strongly support that a stricter labor code is associated with a *higher* investment by firms in the human capital of their employees. Training incidence for a firm facing the 90th percentile of the enforcement of labor regulation relative to a firm facing percentile 10th is 2.1 percentage points higher in a country with a rigid labor regulation (that is, in the 90th percentile of the rigidity of employment index) than in a country with a less rigid labor regulation (i.e., in the 10<sup>th</sup> percentile). Nevertheless, the magnitude of the effect is quantitatively small (average training incidence in our sample is 45.2%). The findings also suggest significant heterogeneity by types of regulation. While stricter hiring regulations and rigidity in the working hours are associated with a higher investment in job training, stricter firing costs tend to be associated with reduced investment in job training by employers.

In sum, our findings strongly suggest that labor market reforms that accelerate the diffusion of temporary contracts and, simultaneously, increase the protection of regular workers reduce the incentives of firms to invest in the human capital of their employees. We show that these findings are robust to several robustness checks.

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more costly and rigid firing costs tend to have a more heterogeneous workforce (coefficient is also statistically significant at 5% level).

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Table 1. Summary Statistics of the Main Variables

Variable	N	Mean	S.D.	Min	Max
Training Incidence	34,135	0.452	0.498	0	1
Small (10-49)	34,135	0.379	0.485	0	1
Medium (50-99)	34,135	0.136	0.343	0	1
Large (100-249)	34,135	0.138	0.345	0	1
Very Large (+250)	34,135	0.162	0.369	0	1
Large City (dummy)	32,746	0.515	0.500	0	1
Age firm	32,877	17.290	16.615	0	215
Exporter	33,608	0.301	0.459	0	1
Minority Foreign Ownership	33,983	0.029	0.166	0	1
Majority Foreign Ownership	33,983	0.048	0.213	0	1
Full Foreign Ownership	33,983	0.061	0.239	0	1
Public Ownership	33,867	0.080	0.271	0	1
Share Skilled Workers	33,908	0.631	0.319	0	1

Source: Author's calculations based on the Enterprise Surveys (World Bank).

**Table 2. Determinants of the Investment On-the-Job Training**

	(1)	(2)	(3)	(4)	(5)	(6)
Small (10-49)	0.17 [0.009]***	0.16 [0.010]***	0.16 [0.010]***	0.18 [0.011]***	0.16 [0.010]***	0.16 [0.010]***
Medium (50-99)	0.32 [0.010]***	0.30 [0.010]***	0.30 [0.011]***	0.31 [0.011]***	0.30 [0.011]***	0.30 [0.011]***
Large (100-249)	0.41 [0.009]***	0.38 [0.010]***	0.38 [0.010]***	0.39 [0.010]***	0.38 [0.010]***	0.39 [0.010]***
Very Large (+250)	0.49 [0.008]***	0.45 [0.009]***	0.45 [0.009]***	0.46 [0.010]***	0.45 [0.009]***	0.46 [0.010]***
Large City (dummy)	0.03 [0.007]***	0.03 [0.007]***	0.03 [0.007]***	0.01 [0.008]	0.03 [0.007]***	0.03 [0.008]***
Age firm	-0.001 [0.000]***	-0.001 [0.000]*	-0.001 [0.000]**	-0.001 [0.000]	-0.001 [0.000]**	-0.001 [0.000]**
Exporter	-	0.07 [0.008]***	0.08 [0.008]***	0.07 [0.009]***	0.07 [0.008]***	0.08 [0.009]***
Minority Foreign Ownership	-	0.04 [0.020]*	0.04 [0.020]**	0.01 [0.022]	0.04 [0.020]**	0.05 [0.021]**
Majority Foreign Ownership	-	0.05 [0.015]***	0.05 [0.015]***	0.02 [0.017]	0.05 [0.015]***	0.06 [0.016]***
Full Foreign Ownership	-	0.08 [0.014]***	0.08 [0.014]***	0.08 [0.016]***	0.08 [0.014]***	0.08 [0.015]***
Public Ownership	-	-	0.01 [0.013]	-0.01 [0.014]	0.01 [0.013]	0.02 [0.014]
Average Years Schooling Workforce	-	-	-	0.03 [0.002]***	-	-
Share Skilled Workers	-	-	-	-	0.006 [0.012]	0.014 [0.012]
Industry Fixed Effects?	Yes	Yes	Yes	Yes	Yes	No
Country Fixed Effects?	Yes	Yes	Yes	Yes	Yes	No
Country - Industry Fixed Effects?	No	No	No	No	No	Yes
Observations	31,491	30,918	30,824	25,860	30,664	30,151

Source: Author's calculations based on the Enterprise Surveys (World Bank).

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports the marginal effects (at mean values) on the firm's propensity to train from probit regressions. Robust standard errors are in brackets. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%. All variables are defined in Table A.1. Micro firms (with than 10 employees) is the omitted size group.

Table 3: Incidence of On-the-Job Training, Labor Regulations and Enforcement of Regulations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rigidity of Employment * Labor Inspections	0.00016 [0.00007]**	0.00013 [0.00008]*	0.00025 [0.00009]***	0.00024 [0.00010]**	0.00025 [0.00010]**	0.00024 [0.00010]**	0.00025 [0.00010]**	0.00025 [0.00009]***
Labor Inspections	0.0033 [0.00201]	-0.00057 [0.00231]	-0.00954 [0.00294]***	-0.00431 [0.00792]	-0.00955 [0.00295]***	-0.00951 [0.00295]***	-0.00952 [0.00294]***	-0.01158 [0.00434]***
Rigidity of Employment * Total Inspections	-	-	-0.00007 [0.00003]**	-0.00007 [0.00003]**	-0.00007 [0.00003]**	-0.00007 [0.00003]**	-0.00007 [0.00003]**	-0.00007 [0.00003]**
Total Inspections	-	-	0.00494 [0.00105]***	0.00493 [0.00105]***	0.00495 [0.00105]***	0.0049 [0.00105]***	0.00494 [0.00105]***	0.0049 [0.00105]***
GDP pc * Labor Inspections	-	-	-	-0.00069 [0.00095]	-0.00156 [0.00138]	-0.00034 [0.00147]	-0.00168 [0.00144]	0.00018 [0.00030]
Rule of Law * Labor Inspections	-	-	-	-	0.00203 [0.00227]	-	-	-
Regulatory Quality * Labor Inspections	-	-	-	-	-	-0.00074 [0.00226]	-	-
Gov. Control Corruption * Labor Inspections	-	-	-	-	-	-	0.00223 [0.00231]	-
Procedures to Start a Business * Labor Inspections	-	-	-	-	-	-	-	0.00014 [0.00030]
Basic Firm Level Controls Included?	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects Included?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects Included?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	30,327	27,358	27,358	27,358	27,358	27,358	27,358	27,358
Differential in Training Incidence P90-P10	0.022	0.018	0.035	0.034	0.035	0.034	0.035	0.035

Source: Author's calculations based on the Enterprise Surveys (World Bank).

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports the marginal effects (at mean values) on the firm's propensity to train from probit regressions. Robust standard errors are in brackets. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%. All variables are defined in Table A.1. Micro firms (with than 10 employees) is the omitted size group.

Table 4: Job Training and Enforcement of Labor Regulations: Robustness Checks

	(1)	(2)	(3)	(4)	(5)	(6)
Rigidity of Employment * Labor Inspections	0.0003 [0.00010]***	0.0002 [0.00010]**	0.0004 [0.00011]***	0.0002 [0.00010]**	0.0002 [0.00010]*	0.0002 [0.00010]**
Labor Inspections	-0.01017 [0.00890]	-0.00435 [0.00873]	-0.00628 [0.00854]	0.00018 [0.00812]	0.0088 [0.00844]	0.00712 [0.00846]
Rigidity of Employment * Total Inspections	-0.00007 [0.00003]**	-0.00005 [0.00003]	-0.00012 [0.00004]***	-0.00008 [0.00003]**	-0.00008 [0.00003]**	-0.00008 [0.00003]**
Total Inspections	0.00518 [0.00114]***	0.00415 [0.00124]***	0.00655 [0.00128]***	0.00523 [0.00112]***	0.0055 [0.00109]***	0.0056 [0.00108]***
Rigidity of Employment * Management Time Spent Dealing with Officials	-0.00003 [0.00003]	-	-	-	-	-
Rigidity of Employment * Property Rights Enforced in the Country	-	-0.00025 [0.00073]	-	-	-	-
Rigidity of Employment * Manager's Education	-	-	0.00014 [0.00029]	-	-	-
GDP pc * Labor Inspections	Yes	Yes	Yes	Yes	Yes	Yes
Basic Firm Level Controls Included?	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects Included?	Yes	Yes	Yes	No	No	Yes
Industry Fixed Effects Included?	Yes	Yes	Yes	No	Yes	Yes
Country-City-Sector Fixed Effects Included?	No	No	No	Yes	No	No
Country-Size-Sector Fixed Effects Included?	No	No	No	No	Yes	No
Country-City-Size Fixed Effects Included?	No	No	No	No	No	Yes
Observations	23,567	23,613	19,078	26,539	25,783	26,515

Source: Author's calculations based on the Enterprise Surveys (World Bank).

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports the marginal effects (at mean values) on the firm's propensity to train from probit regressions using the base specification (in column (4) of table 3). Robust standard errors are in brackets. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

All variables are defined in Table A.1. Micro firms (with than 10 employees) is the omitted size group.

**Table 5: Job Training and Enforcement of Labor Regulations: Mean Inspections**

	Mean Inspections City- Size-Sector I	Mean Inspections City- Size-Sector II	Mean Inspections City- Size-Sector III
	(1)	(2)	(3)
Rigidity of Employment * Labor Inspections	0.0005 [0.00016]***	0.0005 [0.00018]***	0.0007 [0.00028]***
Labor Inspections	-0.0343 [0.01390]**	-0.0331 [0.01566]**	-0.0548 [0.02318]**
Rigidity of Employment * Total Inspections	-0.0001 [0.00005]	-0.0001 [0.00006]	-0.0001 [0.00008]*
Total Inspections	0.0056 [0.00175]***	0.0053 [0.00197]***	0.0069 [0.00280]**
GDP pc * Labor Inspections	Yes	Yes	Yes
Basic Firm Level Controls Included?	Yes	Yes	Yes
Country Fixed Effects Included?	Yes	Yes	No
Industry Fixed Effects Included?	Yes	Yes	No
Observations	29,170	29,431	29,580
Differential in Training Incidence P90-P10	0.07	0.08	0.11

Source: Author's calculations based on the Enterprise Surveys (World Bank).

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports the marginal effects (at mean values) on the firm's propensity to train from probit regressions using the base specification (in column (4) of table 3). Column (1) to (3) measure inspections (labor and total) with average number of inspectors faced by the firm in the same country, city, sector and size bracket. Column (1) considers 2 sector categories (manufacturing and services), column (2) considers 9 sector categories and column (3) considers the 27 two-digit sector categories. Robust standard errors clustered at the level of aggregation reported at the top of each column are in brackets. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%. All variables are defined in Table A.1. Micro firms (with than 10 employees) is the omitted size group.

**Table 6: Job Training, Enforcement of Labor Regulations and Sector Volatility**

	(1)	(2)	(3)
Rigidity of Employment * Labor Inspections * Sector Volatility	0.00002 [0.00002]	0.00006 [0.00003]**	0.00006 [0.00003]**
Rigidity of Employment * Labor Inspections	0.00001 [0.00021]	-0.00012 [0.00026]	-0.00015 [0.00027]
Labor Inspections * Sector Volatility	-0.00096 [0.00076]	-0.00192 [0.00102]*	-0.00028 [0.00231]
Rigidity Employment * Sector Volatility	0.00000 [0.00108]	0.00020 [0.00113]	0.00021 [0.00113]
Rigidity of Employment * Total Inspections * Sector Volatility	-	-0.00002 [0.00001]**	-0.00002 [0.00001]**
Basic Firm Level Controls Included?	Yes	Yes	Yes
Country Fixed Effects Included?	Yes	Yes	No
Industry Fixed Effects Included?	Yes	Yes	No
Labor Inspections Included?	Yes	Yes	Yes
Total Inspections Included?	No	Yes	Yes
Rigidity of Employment * Total Inspections	No	Yes	Yes
GDP pc * Labor Inspections	No	No	Yes
Observations	20,855	20,855	20,855
Implied Coefficient	0.0005	0.0009	0.0009
Differential in Training Incidence P90-P10	0.089	0.148	0.155

Source: Author's calculations based on the Enterprise Surveys (World Bank) and Job reallocation (Davis and Haltiwanger, 1999).

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports the

marginal effects (at mean values) on the firm's propensity to train from probit regressions using the base specification, which includes all the variables

in column (7) of table 2 (including country and industry fixed effects). Robust standard errors are in brackets. \* significant at 10%, \*\* significant at

5%, \*\*\* significant at 1%. All variables are defined in Table A.1. Micro firms (with than 10 employees) is the omitted size group.

**Table 7. Determinants of the Investment On-the-Job Training: Robustness to Different Samples.**

	Excluding the following groups of firms:					
	Africa & MENA	East & South Asia	ECA	LAC	Low Income	Capital City
	(1)	(2)	(3)	(4)	(5)	(6)
Rigidity of Employment * Labor Inspections	0.0003 [0.00011]**	0.0001 [0.00014]	0.0003 [0.00011]***	0.0002 [0.00011]	0.0003 [0.00011]***	0.0003 [0.00011]**
Labor Inspections	-0.0247 [0.01148]**	0.0114 [0.01040]	-0.0057 [0.00861]	0.0058 [0.00873]	-0.0133 [0.01003]	-0.0058 [0.00964]
Rigidity of Employment * Total Inspections	-0.0001 [0.00004]*	0.0000 [0.00004]	-0.0001 [0.00004]**	-0.0001 [0.00003]**	-0.0001 [0.00004]***	-0.0001 [0.00004]**
Total Inspections	0.0052 [0.00118]***	0.0026 [0.00152]*	0.0059 [0.00129]***	0.0048 [0.00109]***	0.0056 [0.00114]***	0.0052 [0.00123]***
GDP pc * Labor Inspections	Yes	Yes	Yes	Yes	Yes	Yes
Basic Firm Level Controls Included?	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects Included?	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects Included?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,692	17,930	18,995	22,457	20,811	19,614
Differential in Training Incidence P90-P10	0.034	0.008	0.076	0.036	0.051	0.044

Source: Author's calculations based on the Enterprise Surveys (World Bank).

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports the marginal effects (at mean values) on the firm's propensity to train from probit regressions using the base specification (column (4) in table 3). Robust standard errors are in brackets. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%. All variables are defined in Table A.1. Micro firms (with than 10 employees) is the omitted size group. Column (1) excludes those firms located in Africa and Middle East, column (2) excludes firms in East and South Asia, column (3) excludes firms in Eastern Europe, column (4) excludes firms in Latin America, column (5) excludes firms in low income countries and column (6) excludes firms in the country capital city.

**Table 8: Job Training and Enforcement of Labor Regulations: Manufacturing Sectors**

	All	High-Tech Manufacturing	Low-Tech Manufacturing
	(1)	(2)	(3)
Rigidity of Employment * Labor Inspections	0.0003 [0.00011]***	0.0002 [0.00019]	0.0003 [0.00013]**
Labor Inspections	-0.00475 [0.00920]	-0.00375 [0.01571]	-0.00553 [0.01120]
Rigidity of Employment * Total Inspections	-0.00006 [0.00004]	-0.00012 [0.00006]*	-0.00002 [0.00005]
Total Inspections	0.00469 [0.00129]***	0.00590 [0.00190]***	0.00369 [0.00169]**
GDP pc * Labor Inspections	Yes	Yes	Yes
Basic Firm Level Controls Included?	Yes	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes
Industry Fixed Effects?	Yes	Yes	Yes
Observations	20,909	6,863	14,035
Differential in Training Incidence P90-P10	0.054	0.047	0.046

Source: Author's calculations based on the Enterprise Surveys (World Bank).

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports the

marginal effects (at mean values) on the firm's propensity to train from probit regressions using the base specification (column (4) of table 3).

Robust standard errors are in brackets. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%. All variables are defined in Table A.1.

Micro firms (with than 10 employees) is the omitted size group. Column (1) considers only firms in manufacturing sectors, column (2) considers

only firms in high-tech manufacturing sectors and column (3) considers only firms in low-tech manufacturing sectors. Low-tech industries include

beverages, food, garments, leather, non-metallic and plastic materials, paper, other manufacturing, textiles, and wood and furniture.



**Table 9: Job Training, Labor Regulations and Enforcement of Regulations: Different Dimensions of Labor Laws**

	Rigidity of Employment	Difficulty of Hire	Difficulty of Firing	Firing Costs	Rigidity of Hours
	(1)	(2)	(3)	(4)	(5)
Labor Regulation * Labor Inspections	0.00024 [0.00010]**	0.00010 [0.00004]**	-0.00010 [0.00006]*	-0.00005 [0.00003]*	0.00017 [0.00006]***
Labor Regulation * Total Inspections	-0.00007 [0.00003]**	-0.00004 [0.00001]***	0.00003 [0.00002]*	0.00002 [0.00001]***	-0.00003 [0.00002]*
Labor Inspections	-0.00431 [0.00792]	0.00235 [0.00696]	0.01028 [0.00840]	0.00927 [0.00794]	0.00052 [0.00696]
Total Inspections	0.00493 [0.00105]***	0.00395 [0.00051]***	0.0017 [0.00070]**	0.00142 [0.00061]**	0.00385 [0.00069]***
GDP pc * Labor Inspections	-0.00069 [0.00095]	-0.00101 [0.00094]	-0.00127 [0.00102]	-0.00111 [0.00098]	-0.00105 [0.00093]
Basic Firm Level Controls Included?	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects Included?	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects Included?	Yes	Yes	Yes	Yes	Yes
Observations	27,358	27,358	27,358	27,358	27,358
Differential in Training Incidence P90-P10	0.034	0.036	-0.030	-0.023	0.034

Source: Author's calculations based on the Enterprise Surveys (World Bank).

Dependent variable is a dummy variable that assumes the value 1 if the firm offers formal on-the-job training to its employees. Table reports the

marginal effects (at mean values) on the firm's propensity to train from probit regressions using the base specification, which includes all the

variables in column (7) of table 2 (including country and industry fixed effects). Robust standard errors are in brackets. \* significant at 10%, \*\*

significant at 5%, \*\*\* significant at 1%. All variables are defined in Table A.1. Micro firms (with than 10 employees) is the omitted size group.

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### Summary Findings

This paper studies the link between labor market regulations and the incentives of firms to invest in the human capital of their employees. We explore a firm level data set across several developing countries and compare the supply of formal training programs for firms exposed to different degrees of de facto labor regulations. Our findings show that a more flexible labor code tends to be associated with a smaller investment in job training. However, this effect is small and heterogeneous. Reforms that simultaneously accelerate the diffusion of temporary contracts and increase the protection of permanent workers tend to generate negative effects on the firm's investment in human capital.

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